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10/582,936	06/15/2006	Toshiyuki Maeda	2257.0260PUS1	9823

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EXAMINER	
BEHM, HARRY RAYMOND	

ART UNIT	PAPER NUMBER
2838	

NOTIFICATION DATE	DELIVERY MODE
01/08/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/582,936	MAEDA ET AL.	
	Examiner	Art Unit	
	HARRY BEHM	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 November 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 12/31/08 have been fully considered but they are not persuasive. Applicant argues the mere fact that the individual elements are known does not disclose or suggest that one skilled in the art would use a switching element having a breakdown voltage twice the voltage required for the switching element. However, Toshiba Application Guideline #15 teaches using a switching element having a breakdown voltage twice the voltage required ("First of all, the DC bus voltage is approximately equal to 2 x RMS AC input voltage", Toshiba Application Guideline #15 sheet 1).

Applicant further argues nowhere in the cited references is there any disclosure or suggestion of using a switching element with a breakdown voltage twice that of the voltage required. However, the Toshiba Application Guideline #15 teaches using a 1700V rated IGBT for a required voltage of 600 Vac nominal. Since the required voltage of 600 Vac is rectified to 848 V, the breakdown voltage is taught to be twice the voltage required.

Drawings

The drawings were received on 11/25/08. These drawings are approved.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimakage (US 6,550,290) in view of Makino (JP 04-359890), Mitsubishi Application Note "Using Intelligent Power Modules" and further in view of Toshiba Application Guideline 15.

With respect to Claim 1, Shimakage discloses a current supply circuit (Fig. 5) applied with an AC voltage (Fig. 5 34 voltage) of a predetermined effective value [nominal line voltage] to output a polyphase AC current (Fig. 5 40a,40b,40c currents) to a polyphase load (Fig. 5 17) of a predetermined rate power [nominal line voltage] comprising voltage doubler rectifying circuit and a polyphase inverter (Fig. 5 37) including series switching elements (Fig. 5 38a,b) and outputting an AC current from each node (Fig. 5 40a).

Shimakage does not disclose the voltage of the AC source. Makino teaches doubling a 200V power supply (Fig. 1 14). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 200 V power supply. The reason for doing so is it is well known that a 200V power supply is a standard voltage provided in Japan, as taught by Makino.

Shimakage does not disclose the breakdown voltage of the switching elements. The Mitsubishi Application Note teaches use of a 1200V module with the advantages of "higher reliablility, lower cost and reduced EMI". It would have been obvious to one of ordinary skill in the art at the time of the invention to use 1200V transistor, such that said switching element is selected to have a second breakdown voltage [1200V], said second breakdown voltage being twice a first breakdown voltage required [565V nominal] of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage [voltage doubled and rectified to 565V nominal] is input to said polyphase inverter circuit, and said switching element is selected to produce almost the same turn-on losses [Fig. 6.34 P(W)] in a rated current value of said polyphase inverter circuit, said rated current value being obtained by dividing said rated power of said polyphase load by a voltage value being twice said effective value voltage [Fig. 6.34 Vcc=600V] as said turn-on losses, as turn-on losses based on dynamic losses required in regard to said switching element and said switching frequency of said inverter.

The reason for doing so was there were many known reasons for using a 1200 voltage transistor in a 400 volt application. It was well known to oversize the transistor to provide overvoltage protection. It was also well known that heating occurs as current squared, therefore for the same amount of power provided, by doubling the voltage the required current is halved and the current squared losses are reduced. It was also known to oversize transistors to extend the life and reliability of the product;

"In order to understand the significance of utilizing more expensive, 1700V rated IGBTs in 600V drives used in heavy duty, industrial applications, some basics need to be outlined.

First of all, the DC bus voltage is approximately equal to 2 x RMS AC input voltage. If the input voltage for example is 600V, the DC bus voltage becomes 848V. If the input voltage rises to 10% above nominal, i.e. 660V the DC bus voltage becomes 933V. If there are any transients on the line, the input voltage increases accordingly. When the drive slows the load down, the motor acts like a generator and transfers energy back to the drive further increasing the DC bus voltage. If a conventional 1200V PIV rated IGBT is used in a drive, it is apparent that the DC bus voltage can rapidly approach the PIV rating of the device.
Secondly, to make matters even more complex, reflected waves caused by the fast rise times of the IGBT interacting with the motor impedance and cable characteristics can cause additional over voltage stresses on the IGBTs …
Finally, if the DC bus trip voltage is set too close to the PIV rating of the IGBTs, they will be subjected to undue stress, which can easily lead to premature failure…
Transistors which are "oversized" can handle significantly more transient current before tripping and have additional thermal capability to prevent damage due to the transient I^2t heating during a fault condition. In short, larger output transistors translate into improved ability for a drive to accommodate overload stresses without damage or partial damage. This is a key feature of an industrial duty drive. Increased output transistor sizing provides increased reliable overload capability" (Toshiba Application Guideline #15, pages 1-2).

With respect to Claim 2, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein said AC voltage of said predetermined effective voltage is a single phase (Shimakage Fig. 5 34), and said current supply circuit further comprises a voltage doubler rectifying circuit (Shimakage Fig. 5 29) on said AC voltage of said predetermined effective voltage to output a rectified voltage to said polyphase inverter circuit (Shimakage Fig. 5 37).

With respect to Claim 3, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein the inverter module is modularized as set forth above. It would have been obvious to one of ordinary skill in the art at the

time of the invention to modularize the rectifier. The reason for doing so is to reduce the size and cost.

With respect to Claim 4, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose the current supply circuit as set forth above wherein a polyphase motor (Shimakage Fig. 5 17). Shimakage does not disclose the rating for the motor. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a 400V motor. The reason for doing so is the voltage bus (Fig. 5 44) is operated at 400V.

With respect to Claims 5-6, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method. See claims 1 and 2 for additional details.

With respect to Claim 7, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method as set forth above wherein the switching element is selected in a range of low turn-on losses since the switching elements are switched on or off quickly.

With respect to Claim 8, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method as set forth above. It would have been obvious to one of ordinary skill in the

art at the time of the invention to optimize the turn on losses and breakdown voltage. Optimization of losses or breakdown voltage through routine experimentation is typically not patentable. See MPEP 2144.05 II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert.

denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

With respect to Claims 9-10, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method as set forth above. See claims 7 and 8, respectively, for additional details.

With respect to Claim 13, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method as set forth above, and Shimakage in view of Makino, and Toshiba Application Guideline #15 disclose do not disclose the switching frequency. Mitsubishi Application Note “Using Intelligent Power Modules” teaches how to determine the control circuit current for a 1200 volt module when operating at 7kHz, "For example, to determine the maximum control circuit current for a PM300DSA120 operating at 7kHz” (page 17). It would have been obvious to one of ordinary skill in the art at the time of the invention to operate at 7kHz switching frequency. The reason for doing so was it is well known to operate high power electronics at 7kHz or less as taught by the Mitsubishi Application Note.

With respect to Claim 14, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose

a method as set forth above, wherein the predetermined effective voltage is 200 V and the first breakdown voltage is 600 V.

With respect to Claim 15, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method as set forth above, wherein the switching element is an IGBT.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimakage (US 6,550,290) in view of Makino (JP 04-359890), Mitsubishi Application Note “Using Intelligent Power Modules”,Toshiba Application Guideline #15 and further in view of Mitsubishi Application Note "General Considerations for IGBT and Intelligent Power Modules".

With respect to Claim 11, Shimakage in view of Makino, Mitsubishi Application Note “Using Intelligent Power Modules” and Toshiba Application Guideline #15 disclose a method as set forth above, and do not disclose how to predict the switching loss. Mitsubushi Application Note “General Considerations for IGBT and Intelligent Power Modules" teaches how to determine the switching loss in IGBT Loss equation 1, which is a product of three terms , the IGBT saturation voltage drop (Vce(SAT)), the peak value of sinusoidal output current (Icp), and the time integral of the cycle. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the

switching losses. Optimization of losses through routine experimentation is typically not patentable. See MPEP 2144.05 II. OPTIMIZATION OF RANGES

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert.

denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

With respect to Claim 12, Shimakage in view of Makino, Mitsubishi Application Note "Using Intelligent Power Modules" ,Toshiba Application Guideline #15 and Mitsubishi Application Note "General Considerations for IGBT and Intelligent Power Modules" disclose a method as set forth above. See claim 11 for additional details.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HARRY BEHM whose telephone number is (571)272-8929. The examiner can normally be reached on 7:00 am - 3:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm E. Ullah can be reached on (571) 272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Akm Enayet Ullah/
Supervisory Patent Examiner, Art Unit 2838

/Harry Behm/
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